Space Weather Forecast

Issued on Thursday, 21 March 2024 at 01:13 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Moderate flares likely (R1-R2 Radio blackouts), slight chance of strong flares (R3 blackouts). Chance of G1/Minor Storm intervals from Coronal Mass Ejection arrivals early Day 1 (21 Mar).

Analysis of Space Weather Activity over past 24 hours
Solar Activity: Activity has been Moderate, with the largest flare peaking at 20/0736 UTC from the largest region in the southeast. This is one of the main regions of interest on the disc and has a large number of smaller spots, showing a couple of areas of magnetic complexity. The other region of most interest is in the northeast (likely a region from the previous rotation which gave three Strong flares, including the largest of the solar cycle so far) which has a large main spot with clear magnetic complexity. New spot regions appearing around the southeastern and northeastern limbs will be re-assessed as they become more clearly visible. Another new region has recently developed in the southwest, but is small and simple currently. The remaining regions appear stable or showing slight decay.

No Earth directed Coronal Mass Ejections (CMEs) have been observed in the last 24 hours.

Solar Wind / Geomagnetic Activity: Solar winds were initially slightly elevated but have since dropped to ambient levels, around 310-330 km/s. Interplanetary Magnetic Field (IMF) was weak throughout. The north-south component varied weakly. Geomagnetic activity was Quiet (Kp1-2).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is now at background levels following the S1 enhancement on 15-16 Mar.

Four-Day Space Weather Forecast Summary
Solar Activity: Moderate activity is likely with a slight chance of becoming High with any isolated Strong flares, mostly due to the two regions in the east, but other regions in the west bear keeping an eye on.

Solar Wind / Geomagnetic Activity: A complex eruption on 17 Mar saw two possible Earth-directed CMEs. The arrivals of these are expected early on Day 1 (21 Mar), perhaps arriving as two separate shocks but may also arrive together. The more likely impact is from the slower of the two CMEs, but perhaps also a glancing blow from the slightly faster and further south CME. Ongoing effects are possible through the rest of Day 1, before then easing. A coronal hole fast wind may cause a further enhancement later on Day 4 (24 Mar).
Geomagnetic activity is expected to be Unsettled at first. with a chance of Active or G1/Minor Storm intervals (Kp4-5) early on Day 1 in association with the filament eruption CME from 17 Mar, as well as a slight chance of G2/Moderate Storm conditions (Kp6). Effects are then likely to decline later on Day 1, becoming largely Quiet for Days 2-4 (22-24 Mar). Towards the end of Day 4 a coronal hole fast wind may connect with Earth, with geomagnetic activity possibly becoming Unsettled-Active (Kp3-4).

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Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is expected to remain around background levels, with a slight chance of further enhancements. This risk increases slightly through the period.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	40	1	1	5
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	60	60	60	60
Very Active	R3 to R5 X	No	10	10	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	5	10	10	10
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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